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RISK ANALYSIS AND MAN-MADE RISK ASSESSMENT ARE KEY AREAS OF INDUSTRIAL SAFETY MANAGEMENT

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ABSTRACT:

In this article, for industrial sectors, when a number of technological processes are used in the production process, the production processes are dangerous due to pollution of the environment (air, soil, water bodies) and harmful and (or) hazardous production factors that do not meet the maximum allowable standards and safety requirements for hazardous manufacturing processes so that the duration is not accompanied by spreading out of the hazardous zones.

KEYWORDS: Hazardous, environment, pollution, factors, make safety, production facilities, expected human loss, Idustrial sector, and the production process

INTRODUCTION:

Currently, man-made risk assessment is the only analytical tool that allows to identify risk factors for human health, their ratios and, on this basis, to identify priorities for risk minimization. The concept of man-made hazard always includes two elements: the frequency at which a hazardous event occurs and the consequence of that event. Applying the concept of risk allows risk to be categorized into several dimensions. That is, risk is actually a measure of risk, and the absence of unacceptable risk is security.

If its value is so insignificant, it is an acceptable (acceptable) risk, in which a person or society as a whole is willing to take such a risk for the benefits obtained in material and social terms. In foreign practice, the man-made risks involved in solving production problems are determined by law. The maximum "acceptable" level of risk of death of a person is considered to be 10-6 years-1.

RESULTS AND THEIR DISCUSSION:

The permissible probability of failure of the facility during the design and operation of facilities was assessed in accordance with the requirements of GOST 12.1.010-76 10-6 to 1 year, in which production processes should be structured in such a way that there is no possibility of explosion in any explosive area during the year. If the possibility of such an explosion is not technically or economically feasible, the production processes should be designed so that the probability of exposure to the hazardous factors of an explosion in a person during the year should not exceed 10-6 years

According to the above law, the normative indicators of fire risk for production facilities must be within the following limits:

1) The value of individual fire risk in the territory of buildings, structures and industrial facilities should not exceed 110-6 years-1. However, the risk of death of

people under the influence of hazardous fire factors should be determined taking into account the operation of fire safety systems of buildings, structures and enterprises.

2) For production facilities with an individual fire risk of 110-6 years-1, the individual fire risk may increase to 110-4 years-1. At the same time, it is necessary to train employees in the actions during a fire and to take measures to provide social protection to employees, compensating their work in high-risk conditions.
3) The value of the individual fire risk under the influence of dangerous fire factors at the production facility for people in the residential area close to the facility should not exceed 110-8 years.
4) The value of the social fire risk under the influence of hazardous fire factors at the production facility for people in the residential area close to the facility should not exceed 110-6 years.

OBJECTS AND RESEARCH METHODS:

In the quantitative assessment of the risk of accidents, it is proposed to consider the definition of the numerical properties of the random value of damage caused to people, property and the environment from accidents at hazardous production facilities. Quantitative risk assessment assesses the likelihood (frequency) of occurrence of different scenarios of accidents for human life and health, property and the environment, and the corresponding severity values of the consequences.

It is recommended to use the following key risk indicators to assess the risk of accidents:

- Individual risk - the expected frequency of injuries to an individual as a result of the impact of the studied harmful factors of the accident;

- Potential regional hazard (or potential hazard) - the frequency of occurrence of hazardous factors of the accident at the hazardous production facility (HIO) and the adjacent area in question;

- Collective risk (or expected human loss) - the approximate number of people affected by accidents that may occur over a period of time;

- Social risk (or risk of injury to a group of people) - frequent occurrence of accident scenarios in which at least N people are injured to a certain extent.

According to the safety manual, hazard analysis and accident risk assessment at hazardous facilities include the following key steps:

- Planning and organization of risk analysis;
- Identification and assessment of the risk of accidents at hazardous facilities;
- Determining the level of risk of accidents in HIO and (or) identifying the most dangerous components of HIO;
- Development of recommendations to reduce the risk of accidents at hazardous facilities;
- Comparison of accident risk assessments with "permissible" accident risk;
- Development of recommendations to reduce the likelihood of accidents and (or) accidents;
- Development of recommendations to reduce the severity of the consequences of possible accidents.

It should be noted that the main causes of injuries and accidents in "optimal" (deterministic, normalized) production can be divided into 4 main groups:

Organizational;
Technical;
Sanitary-hygienic;
Personal

ORGANIZATIONAL REASONS:

incorrect shift and working hours; absence or inconsistency of work breaks and work rhythm; unsatisfactory training and

certification of employees in terms of knowledge of safe work practices and other factors of production; formal training of employees on occupational safety; lack of information or unsatisfactory condition of hazardous and harmful production factors in the workplace; lack or unsatisfactory condition of regulatory documents; lack of emergency response plans; absence or violation of ergonomic occupational safety requirements, etc.

TECHNICAL REASONS:

Unsatisfactory condition of electrical installations; availability of open moving parts of technological equipment; unsatisfactory condition of protective barriers and screens; lack of security devices and locks or unsatisfactory condition, etc.

SANITARY AND HYGIENIC REASONS:

The presence of toxins and dust in the air in the workplace with concentrations higher than REM; deviation of microclimate parameters of buildings from permissible values; noise, vibration, non-ionizing electromagnetic and ionizing radiation exceeding standard parameters; unsatisfactory condition of the existing climate; exceeding the standard weight and intensity of the labor process; lack or unsatisfactory condition of personal protective equipment; lack or unsatisfactory condition of ventilation in buildings, etc.

PERSONAL REASONS:

professional incompetence; lack of work experience in this workplace; emotional instability; weak will; low self-management skills; distraction; negligence; low level of responsibility; indiscipline; propensity for affective states, etc.

In order to determine the causes of injuries and accidents at work, any accidents and incidents that occur at industrial enterprises of the Republic of Uzbekistan must be investigated.

Risk is a value that is based on and determined in economic and social terms, so it is a difficult task to calculate risk indicators, the main disadvantages of which are:

- Existing methods of estimating the frequency of occurrence of accidents (the occurrence of accidents themselves), a complex, difficult and labor-intensive process, mainly due to the lack of initial data, uncertainty and uncertainty;
- The value of risks with low accuracy of complex and difficult calculations;
- Methods of analysis of "crack trees" and "event trees" require very highly qualified specialists;
- In the analysis of scenarios of accidents in a logical-graphical way ("event trees"), they are set by experts in an expert way;
- The application of a number of assumptions in the existing methodologies of different models of the emergency process, which ultimately leads to serious errors.

From the highlighted features of the forecast risk calculation, it can be concluded that risk is not a sufficiently accurate tool as a quantitative measure of risk assessment, and the calculated values of risk indicators for a specific HIO accident scenario are given in HIO safety declarations, data sheets, basics and so on. Does not correspond to the actual values.

Thus, often calculated values that do not correspond to actual values are compared with deterministic (“acceptable”) risk. As a result, risk mitigation recommendations can be superficial, sometimes formal, especially when it is necessary to limit economic costs to ensure security.

The highlighted features and shortcomings of risk assessment and analysis can be added, and the general meaning of individual risk values, e.g., 10-5 or -8 -1, 10 years, is

understandable only to a narrow range of professionals.

In order to address the identified shortcomings, it is recommended to use a method based on the degree of protection of HIO personnel from the harmful effects of accidents, rather than the calculated values of risks, taking into account the location of maintenance personnel in emergencies and the availability of means to protect them.

To solve this problem, it is recommended to consider the following levels of protection:

Level I protection (high) - means of personal and / or collective protection, which prevents the impact of the harmful factors of accidents on employees, excludes the possibility of injury and death;

- Level II of protection (average) - means and methods of individual and / or collective protection against the impact of harmful factors on employees in accidents with a high probability of injury (~ 1) and excluding his death (~ 0);
- Level III of protection (low) - protection of personal and / or collective means of protection, the probability of death of a person is 0.6 and the prevention of exposure of employees to accidents with injuries (severe and minor) and the degree of complete failure is 0.4 (delete) tools.

Means and methods of risk reduction and / or localization include:

- Underground operator's rooms;
- The building, separate control rooms and structures are designed according to the first class of liability against explosion;
- Flammable gas and steam, air mixtures passing through reinforced buildings away from external sources of explosion of air mixtures, providing a decrease in excess pressure at the front of the wave during the compression phase;
- Pressure chambers for explosive processes;
- Placement of hazardous substances in underground warehouses;
- Placement of harmful substances in reinforced concrete galleries and underground tunnels of transport communications, etc.

It is recommended to use the protection level coefficient (autumn) to quantify the level of protection of employees from the effects of harmful factors of accidents (autumn) and it is a modified indicator of the safety factor

All of the above causes of industrial injuries can be divided into three types:

1. Technician;
2. organizational;
3. Personal (psychophysiological).

Technical causes of industrial injuries “imperfections” of geological processes can be described as reasons related to design defects and technical condition of equipment, buildings and structures, tools and equipment, collective and individual protective equipment and tools, insufficient mechanization of heavy work, including barriers, imperfections of safety devices. Alarm and blocking devices, the presence of resistance defects in materials and previously unknown hazardous properties of the substances used, etc.

These reasons are also called design or engineering. They are closely interrelated and include violations of sanitary-hygienic norms, increase of harmful substances in the air of working areas (above REQ), insufficient or inefficient lighting, noise, vibration levels, unfavorable meteorological conditions; the presence of various radiations above the permissible values, etc.

The organizational causes of occupational injuries depend entirely on the level of organization of work in the workplace and in the enterprise as a whole. These include: deficiencies in the use of roads and overpasses in the regions; violation of the rules of operation of equipment, vehicles, tools; shortcomings in the organization of

workplaces; violation of technological regulations; violation of the rules of transportation, storage and distribution of materials and products; violation of the rules of scheduled preventive maintenance of equipment, vehicles and instruments; shortcomings in the training of workers in safe work practices; shortcomings in the organization of group work; poor technical control of hazardous processes; use of machines, mechanisms and tools for other purposes; absence or imperfection of barriers in the workplace; lack, failure or non-use of personal protective equipment, etc.

Personal (psychophysiological) causes of occupational injuries may conditionally include the physical and neuropsychological overload of the employee, leading to his or her misbehavior. Human overloads can cause incorrect movements due to physical (static and dynamic), mental stress fatigue.

Overuse of human analyzers (visual, auditory, tactile), uniformity of work, stressful situations, injuries caused by painful conditions can result from a conflict between the anatomical, physiological, mental characteristics of the human body and the nature of the work performed. In many technical systems, the design of machines, devices and control systems still does not adequately take into account the physiological, psychophysiological, psychological and anthropometric characteristics and capabilities of man.

Almost all accidents are due to several causes and coincidences, but the first is a violation of labor protection requirements.

Source of social risk	Social risk factors
Urbanization of ecologically unstable areas	Location of people in areas with possible flooding, landslides, floods, landscape fires, volcanic eruptions, increased seismicity of the region
Industrial technologies and high-risk facilities	Accidents at nuclear power plants, thermal power plants, chemical plants, product pipelines, etc. are traffic accidents. Man-made pollution of the environment
Social and military conflicts Fighting.	Use of weapons of mass destruction
EPIDEMIA	Prevalence of viral infections
Decreased quality of life	Hunger, poverty. Deterioration of medical care. Poor quality food. Unsatisfactory living conditions

It should be noted that the accident is not only the result of purely technical reasons, but also intermediate stages between the wrongful actions of workers and their

consequences. At the same time, a formal technical, organizational, and personal separation of the causes allows the causes of the accident to be identified and the necessary steps to be taken to rectify the situation.

Analyzes show that in recent years, the psychological and physiological stress problems of the worker have become more and more advanced, delaying the improvement of traditional working conditions related to physical factors of the environment (temperature, humidity, light, noise, vibration and polluted atmosphere).

Sources and factors of social risk:

Damage to society caused by the type of activity in question

B= Zb+U,

Where Zb is the cost of achieving this level of security;

It is damage caused by insufficient protection of a person and his environment from dangers.

Net profit, ie. the sum of all benefits received by the company from the type of activity in question (in terms of value):

П=Д - Зб - В>0 или П=Д - Зп - Зб - У>0,

WhereД is the total income from the type of activity under consideration;

Зп - basic production costs.

An economically reliable life safety formula has a form

У < Д - (Зп + Зб).

CONCLUSION

Safety of production processes must be ensured by a system of preventive measures, including the design of technological processes, their implementation, industrial buildings, structures, equipment and technological processes must meet safety requirements.

Thus, the safety of life activities during the current pandemic, including the safe operation of production processes, is in many respects also important for the psychophysiological condition of workers, and it is important to comply with the above requirements. These requirements include the rational use of territory and production facilities, proper operation of equipment and organization of technological processes, protection of workers from harmful working conditions, maintenance of production facilities and workplaces in accordance with sanitary and hygienic norms and regulations, regulation of sanitary facilitie.

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